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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/653,152	09/03/2003	Chandra Mouli	M4065.0970/P970	2509
24998	7590	09/22/2005		
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP 2101 L Street, NW Washington, DC 20037			EXAMINER WILSON, ALLAN R	
			ART UNIT	PAPER NUMBER
			2815	
DATE MAILED: 09/22/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/653,152

Applicant(s)

MOULI, CHANDRA

Examiner

Allan R. Wilson

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 9-15, 21-39 and 47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 16-20, 40, 44-46, 48 and 49 is/are rejected.
- 7) ☒ Claim(s) 5, 41-43 and 50 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-8, 16-20, 40, 44-46, 48 and 49 are rejected under 35 USC § 103 (a) as being unpatentable over McClure, U.S. Patent No. 6,780,666 B1 (or Applicants Prior Art) in view of Liu et al. ("Liu") U.S. Patent No. 6,211,404.

With regards to claim 1, McClure illustrates in figures 1-6, a photosensor 12 having a first doped region 12a and a second doped region 12b in association with a semiconductor substrate 14; an isolation region 32 formed within said substrate.

McClure does not show a halogen-rich region localized at least at a sidewall region and a bottom portion of said isolation region. Liu illustrates in at least figures 3 and 4 a halogen-rich region 52 (fluorine, col. 5, lines 42-48) localized at least at a sidewall region and a bottom portion of an isolation region. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a halogen-rich region to use for the formation of shallow trench isolations (STI, col. 5, lines 51-54) with a process that prevents dielectric voids and corner clipping (abstract).

With regards to claim 2, Liu illustrates in figs. 3 and 4 said halogen-rich region is in the sidewalls of the trench and therefore when combined with McClure said halogen-rich region will be between said isolation region and said photosensor.

With regards to claims 3, 17, 40, 44 and 49, Liu discloses in col. 5, lines 42-48, said halogen-rich region 52 is formed with fluorine at least at a boundary between said shallow trench isolation region and said substrate 40.

With regards to claim 4, Liu illustrates in fig. 4 said halogen-rich region is in the sidewalls of the trench and therefore when combined with McClure said halogen-rich region and said first doped region 12a of said photosensor will overlap.

With regards to claim 6, said halogen-rich region has a concentration of halogen ions from about  $1 \times 10^{14}/\text{cm}^3$  to about  $1 \times 10^{15}/\text{cm}^3$  is within the level of ordinary skill in the art.

With regards to claims 7 and 18, McClure illustrates in figures 1-6 a charge collection region 18 electrically connected to readout circuitry 24, 26, 28.

With regards to claims 8 and 19, McClure illustrates in figs. 1-6 a transfer transistor 16 formed between and connecting said photosensor 12 and said charge collection region 18.

With regards to claim 16, Liu illustrates in fig. 4 a halogen-rich region 52 formed within at least one trench. The limitation "said photosensor being capable of generating dark current" and "for the suppression of said dark current" is an inherent function of the structure and since the prior art has the same structure and materials as the claimed invention it will have the same inherent function.

With regards to claim 20, McClure illustrates in figs. 1-6 a reset transistor 22 electrically connected to said charge collection region 18.

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With regards to claim 45, the limitation “for suppressing the flow of dark current from said photosensor” is an inherent function of the structure and since the prior art has the same structure and materials as the claimed invention it will have the same inherent function.

With regards to claim 46, a concentration of halogen ions from about  $1 \times 10^{14}$  to  $1 \times 10^{15}$  atoms/cm<sup>3</sup> is within the level of ordinary skill in the art.

With regards to claim 48, the limitation “for suppressing the presence of charge collecting dangling bonds of said substrate at the sidewall region” is an inherent function of the structure and since the prior art has the same structure and materials as the claimed invention it will have the same inherent function.

#### ***Allowable Subject Matter***

Claims 5, 41-43 and 50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments***

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

In response to applicant's argument that use of a halogen-rich region to suppress dark current, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the

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differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson whose telephone number is (571) 272-1738. Examiner Wilson can normally be reached 7:00-4:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allan R. Wilson  
Primary Examiner  
21 September 2005